performed by moving the sample back-and-forth between sensors at the end of the read chamber.

[0291] Sometime before, during, or after sample incubation, a positive control assay is also performed in the other binding chamber: wash buffer is pulled from the wash buffer storage chamber **3240** to sensor #2 by pulling vacuum on vent port **3264** with vent port **3241** open to air. A fluid slug is metered by closing vent port **3241** and opening vent port **3244** to introduce air behind the metered fluid as it is drawn toward control detection chamber **3250**. The metered fluid slug is then drawn over and dissolves dry control reagents **3252**. These reagents, preferably, include labeled binding reagents (preferably antibodies), defined amounts of the analytes for the assays (to provide positive controls), stabilizing reagents and/or other assay reagents. The positive control sample, comprising the metered wash buffer slug and rehydrated control reagents, is then incubated in the control detection chamber **3250** either in a static fashion or with mixing by moving the sample between sensors located at the end of the control binding zone.

[0292] Following the incubation steps, the positive control sample is drawn into waste chamber **3254** and the extracted swab sample is drawn into the waste chamber **3228**. Both detection chambers are washed in a consecutive or simultaneous manner by drawing wash buffer from wash buffer chamber **3240** through the detection chambers and into their corresponding waste chambers (waste chamber **3228** for detection chamber **3230** and waste chamber **3254** for control detection chamber **3250**). The wash reagent used during the wash step is preferably segmented by introducing air at vent port **3244**. After washing, both the control and sample binding zones are filled with wash buffer to complete the fluid sequence. Advantageously, wash reagent flows through detection chamber **3230** in a direction opposite that in which sample was introduced into chamber **3230**. This reverse flow wash ensures the efficient removal of any components in the sample and/or extraction buffer that could interfere with a measurement in the detection chamber.

[0293] Preferably, the binding of analyte and/or labeled binding reagents to binding domains in the detection chambers is measured by an ECL measurement as described above for cartridge **2500**. ECL is initiated by applying the desired electrical potentials to electrodes supporting the binding zones. The positive control binding zones in detection chamber **3250** will provide a positive signal for each assay and may be used to provide assurance that the assay reagents onboard the cartridge have not degraded. The ECL signal from any of the sample binding zones in detection chamber **3230** indicates the presence of analyte binds to that capture zone or competes with the binding of a labeled reagent to that capture zone.

[0294] The assay modules (preferably assay cartridges) of the invention may be used to carry out a variety of different assay formats for measuring analytes interest, preferably formats based on electrode induced luminescence measurements. The assays, preferably, comprise the steps of introducing a sample, and optionally one or more solution phase assay reagents, into an detection chamber (preferably a flow cell) that comprises one or more assay domains (preferably a plurality of assay domains) comprising immobilized assay reagents that bind (with at least some degree of selectivity) with analytes of interest. Preferably, there are at least two assay domains that comprise binding immobilized binding reagents that differ in their selectivity for analytes. Preferably, there is a patterned array of immobilized binding reagents. The detection chamber preferably comprises a plurality of electrodes including one or more assay working electrodes having assay domains. In such a case, electrical energy is applied to the electrodes (e.g., in a pair wise fashion as described above) to induce an assay dependent signal (e.g., an electrochemical signal such as a current or potential or, preferably, an electrode induced luminescence signal, most preferably an electrochemiluminescence signal) at the electrodes which is dependent on the amounts of the analytes of interest present in the sample. The assay dependent signal is measured to determine the amounts of the analytes of interest. The assays may comprise the step of washing the electrodes with a wash solution or they may be carried out in a non-wash format. In washed electrochemiluminescence assays, the assay preferably comprises the steps of washing the electrodes with a solution comprising an electrochemiluminescence coreactant (e.g., a tertiary alkyl amine such as tripropylamine or PIPES; for other examples of suitable coreactants see copending U.S. patent application Ser. No. 10/238,437 filed Sep. 10, 2002) and inducing ECL in the presence of the coreactant. In non-washed ECL assays, a coreactant is preferably introduced into the detection chamber with the sample or is present in the detection chamber prior to the introduction of the sample. Advantageously, assay modules comprising a plurality of assay domains, preferably on a plurality of electrodes, may be used to conduct assays for a plurality of analytes of interest.

[0295] In preferred embodiments of the invention, the assay modules (preferably, assay cartridges) of the invention are used to carry out binding assays, most preferably sandwich or competitive binding assays, preferably sandwich or competitive immunoassays. Such assays may, optionally, comprise the step of introducing into the detection chamber labeled binding reagents such as a labeled binding partner of the analyte of interest or a labeled competitor that competes with the analyte of interest for a binding partner of the analyte of interest. Alternatively, these reagents may be stored in dry or wet form in the detection chamber. For more information on the conduct of binding assays, particularly using electrochemiluminescence based detection, see copending U.S. patent application Ser. No. 10/185,274, filed Jun. 28, 2002 and copending U.S. patent application Ser. No. 10/238,391, filed Sep. 10, 2002, these patent applications hereby incorporated by reference.

[0296] The assay modules (preferably, assay cartridges) may be used to carry out panels of assays. Suitable panels include panels of assays for analytes or activities associated with a specific biochemical system, biochemical pathway, tissue, organism, cell type, organelle, disease state, class of receptors, class of enzymes, class of pathogen, environmental sample, food sample, etc. Preferred panels include immunoassay for cytokines and/or their receptors (e.g., one or more of TNF-α, TNF-β, IL1-α, IL1-β, IL2, IL4, IL6, IL10, IL12, IFN-γ, etc.), growth factors and/or their receptors (e.g., one or more of EGF, VGF, TGF, VEGF, etc.), second messengers (e.g., cAMP, cGMP, phosphorylated forms of inositol and phosphatidyl inositol, etc.) drugs of abuse, therapeutic drugs, auto-antibodies (e.g., one or more antibodies directed against the Sm, RNP, SS-A, SS-B Jo-1, and Scl-70 antigens), allergen specific antibodies, tumor mark-